REMARKS:

The preceding claim amendments and the following remarks are submitted as a full and complete response to the Office Action issued on October 17, 2008. Claims 1, 2, 4 and 5 have been amended and new claims 8-13 have been added. Support for the amendments of claims 1 and 2 can be found in the original claim 3 and throughout the specification, for example, at pages 4-5 and 8. Support for new claims 8-13 can be found throughout the specification, for example, at pages 4-5 and examples 2-5. No new matter has been added. Claim 3 has been cancelled. Accordingly, claims 1-2 and 4-13 are pending. Reconsideration is respectfully requested.

Claim Rejections Under 35 U.S.C. §102(b)

Claims 1-4 and 6-7 have been rejected as anticipated by Tian et al., Boimimetic Arrays of Oriented Helical ZnO nanorods and Columns, *Journal of the American Chemical Society* ,124(44), pp 12954-12955 (2002) ("Tian"). Applicants respectfully traverse this rejection for reasons that follow.

At the outset, Applicants note that claims 1 and 2 have been revised to recite that (1) the substrate consists essentially of Si-wafer or is made of Al_2O_3, GaN, $ScAlMgO_4$ or $LiNbO_3$; and (2) the operation of growing the ZnO nanoparticles in the nutrient solution is performed at 90 to 100 °C. Tian's disclosure is limited to using glass as a substrate. While glass comprises silicon as one of elements, silicon contained in the glass is in the form of SiO2; Si-wafer contains Si, not SiO2. Si is totally different from SiO_2 in its physical and chemical properties such as crystalinity. For example, glass is in amorphous form and Si-wafer is crystalline. Tian is silent in

using a substrate other than glass in growing ZnO nanoparticles into crystals. Thus, the claimed method is distinguished from Tian in its substrate to be used.

Furthermore, as admitted in the Office Action (at page 3), with respect to claim 1, Tian does not disclose the reaction temperature of 90 to 100 °C. As for claim 2, Tian fails to teach or suggest a method of forming a ZnO nanowall array.

In addition, Applicants note that the Office seems to argue that Tian discloses using a nutrient solution containing Zn nitrate and hexamethylenetetramine (HMT) to grow Zn nanoparticles into crystals. A closer reading of Tian, however, reveals that in Tian, oriented ZnO rods were prepared first and then helical ZnO nanorods were grown from the oriented ZnO rods. According to Tian, to prepare the ZnO rods, ZnO nanoparticles were deposited on glass substrates, which were first placed in a solution containing Zn nitrate (0.030 M) and HMT (0.030 M), or with the addition of a very small amount of sodium citrate (0.00017 M), and reacted at 60 °C for 3 days. And then, Tian used a solution containing Zn nitrate (0.030 M), HMT (0.10 M) and sodium citrate (0.0010 M) to grow the helical structure of ZnO nanorods. That is, Tian requires preparing oriented ZnO rods first to grow helical ZnO nanorods and, for this purpose, using two different types of nutrient solutions: (1) Zn nitrate and HMT or Zn nitrate, HMT and sodium citrate for preparing the oriented ZnO rods; and (2) Zn nitrate, HMT and sodium citrate for preparing ZnO nanorods. In comparison, the claimed method uses a nutrient solution containing HMT and Zn nitrate, Zn acetate or a derivative thereof (in claim 1) or a nutrient solution containing Zn acetate and sodium citrate (in claim 2) to directly grow ZnO nanoparticles into ZnO nanostructures to form the ZnO nanorod array (in claim 1) or the ZnO nanowall array (in claim 2). That is, the claimed method does not use two different types of nutrient

solutions to produce the ZnO nanorod array or ZnO nanowall array. Thus, Tian fails to teach or disclose using a nutrient solution containing Zn nitrate and HMT to produce ZnO nanorods without a nutrient solution containing Zn nitrate, HMT and sodium citrate. Furthermore, Tian is silent about using a nutrient solution containing ZnO acetate or a derivative thereof and sodium citrate can be used to produce ZnO nanowall array without using a nutrient solution which does not contain HMT. New claims 8-13 have been added to clearly point out these distinctions between the claimed method and Tian. Support for the new claims can be found throughout the specification, including working examples 2-5, which shows that Applicants were in possession of the claimed inventions at the time of the filing of this application.

As explained above, since Tian fails to teach each and every element of the amended claim 1 or 2, it cannot anticipate those claims. Since the independent claims are not anticipated by Tian, claims 4-13, which are dependent from claim 1 or 2, cannot be anticipated by Tian. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Under 35 U.S.C. §103

The Patent Office has rejected claim 5 as obvious over Tian alleging that it could have been obvious to one of ordinary skill in the art at the time the invention was made to change or modify the volume ratio between Zn nitrate to sodium citrate. Applicants respectfully disagree.

First, as discussed in relation to the anticipation rejection, Tian disclose glass only as a substrate and fails to teach or suggest a method of forming a ZnO nanorod array or ZnO nanowall array using a substrate that consists essentially of Si-wafer or

made of Al_2O_3, GaN, $ScAlMgO_4$ or $LiNbO_3$. Furthermore, Tian does not disclose or suggest that a ZnO nanowall array can be formed by using a nutrient solution that contains Zn acetate or its derivative and sodium citrate since Tian's teaching is limited to using three nutrient solutions, none of which contains Zn acetate or its derivative. Second, the claimed method does not use HMT as a nutrient. Since all of the three nutrient solutions disclosed in Tian contain HMT, it would not have been obvious to one skilled in the art producing ZnO nanostructures from ZnO nanoparticles without using HMT. Accordingly, since claim 2 would not have been obvious to one skilled in the art, no *prima facie* case of obviousness with respect to claim 5, which depends on claim 2, can be established.

With respect to the amended claim 1, the Zn nanorods produced from the method of claim 1 is suitable for laser application since it has hexagonal rod-like shapes, uniformity of shapes, perfect orientation and crystalinity as shown in Fig. 2A and Fig. 3. These features are unexpected to one of ordinary skill in the art because Tian only teaches helical ZnO nanorods. It is known that such helical nanorods as disclosed in Tian cannot be used for laser applications due to its irregularity in shape and imperfect orientation as Figure 1 of Tian. Thus, claim 1 would not have been obvious to one of ordinary skill in the art from the teaching of Tian. Considering the above, Applicants respectfully request reconsideration and withdrawal of the obviousness rejections.

In light of the foregoing, Applicants submit that all outstanding rejections have been overcome, and the instant application is in condition for allowance. Thus, Applicants respectfully request early allowance of the instant application. The Commissioner is hereby authorized to charge any fees or credit any overpayment to Deposit Account No. 02-2135.

Respectfully submitted,

By: _____

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